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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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Development of USES Aptitude Test Battery
for

Inhalation Therapist

(medical ser.) 079.368

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U.S. DEPARTMENT OF LABOR
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BUREAU OF EMPLOYMENT SECURITY
Washington, D.C. 20210

Technical Report on Development of USES Aptitude Test Battery
For

Inhalation Therapist (medical ser.) 079.368

S-326

U. S. Employment Service
in Cooperation with
California, Connecticut, Illinois, Minnesota,
New York and Pennsylvania
State Employment Services

Revised August 1966

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Inhalation Therapist (medical ser.) 079.368
S-326

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Inhalation Therapist 079.368. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
V - Verbal Aptitude	100
S - Spatial Aptitude	85
Q - Clerical Perception	90

RESEARCH SUMMARY

Sample:

81 workers employed as Inhalation Therapists in hospitals in California, Connecticut, Illinois, Minnesota, New York, and Pennsylvania.

Criterion:

Supervisory ratings

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .40 ($P/2 < .0005$)

Effectiveness of Norms:

Only 67% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-326 norms, 81% would have been good workers. 33% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the S-326 norms, only 19% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	67%	81%
Poor Workers	33%	19%

SAMPLE DESCRIPTION

Size:

N = 81

Occupational Status:

Employed Workers

Work Setting:

Workers were employed by the following hospitals:

Various Hospitals in Los Angeles County, California and in Philadelphia, Pennsylvania.

Grace New Haven Hospital, New Haven, Connecticut, University of Chicago Hospital, Chicago, Illinois, St. Mary's Hospital, Minneapolis, Minnesota, Northwest Hospital, Minneapolis, Minnesota.

Employer Selection Requirements:

Education: High school graduate - some exceptions.

Previous Experience: None (on-the-job training).

Tests: No tests were used in most hospitals; Grace New Haven Hospital administered the Otis to new employees.

Principal Activities:

The job duties for each worker are comparable to those shown in the Appendix.

Minimum Experience:

All workers had completed an on-the-job training period of at least nine months.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

	Means	SD	Range	r
Age (years)	30.0	9.6	19-54	.029
Education (years)	12.6	1.0	11-16	.173
Experience (months)	34.9	34.8	9-175	.139

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B were administered during the period November 1962 to March 1963.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency. Ratings and reratings for each worker were made at approximately the same time as the tests were administered with a time interval of at least two weeks between the two ratings.

Rating Scale: The USES Descriptive Rating Scale, Form SP-21, was used. The scale (see Appendix) consists of nine items with five alternatives for each item. The alternatives indicate the different degrees of proficiency.

Reliability: The coefficient of reliability between the two ratings was .80 indicating a significant relationship. The final criterion score consisted of the combined score of the two ratings converted to standard scores, with a mean of 50 and a standard deviation of 10.

Criterion Score Distribution: Range of the combined
Standardized Scores: 28-68
Mean: 49.8
Standard Deviation: 10.4

Criterion Dichotomy: The criterion distribution was dichotomized into high and low groups by placing 33% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score was 45.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitude Q which did not have a significant correlation with the criterion was considered for inclusion in the norms because the qualitative analysis indicated that this aptitude was important for the job duties and it had both a relatively high mean and a relatively low standard deviation for the sample. With employed workers, a relatively low standard deviation indicates that some pre-selection may have taken place and this restricted range of scores (low standard deviation) will depress the correlation between the aptitude and the criterion. A relatively high mean with employed workers may also indicate some sample pre-selection. Tables 3, 4, and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
G - General Learning Ability	Required to make judgements in the administration of inhalation therapy; to deal effectively with patients; to instruct nurses and patients in use of equipment; to observe safety precautions; to keep informed on current information in field.
V - Verbal Aptitude	Required to explain and demonstrate procedures for using equipment to nurses and patients, and to talk to patients and alleviate their fears.
P - Form Perception	Required to assemble and check equipment, replace defective parts and make minor repairs.
Q - Clerical Perception	Required to obtain information from chart for billing patient, and to maintain daily statistical records and Kardex file on patients.

M - Manual Dexterity

Required to assemble equipment; to push apparatus to patient's bedside and manipulate controls; to raise or lower patient.

TABLE 4

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Aptitudes	Mean	SD	Range	r
G - General Learning Ability	106.1	16.7	69-145	.264*
V - Verbal Aptitude	107.7	14.6	74-143	.228*
N - Numerical Aptitude	100.9	16.2	63-141	.145
S - Spatial Aptitude	109.1	18.2	68-147	.357**
P - Form Perception	106.3	18.4	65-148	.263*
Q - Clerical Perception	109.7	14.1	72-139	.131
K - Motor Coordination	109.2	14.4	80-146	.225*
F - Finger Dexterity	98.7	19.2	60-145	.358**
M - Manual Dexterity	104.6	19.0	52-144	.134

*Significant at the .01 level

**Significant at the .05 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes									
	G	V	N	S	P	Q	K	F	M	
Job Analysis Data										
<u>Important</u>	X	X			X	X			X	
Irrelevant										
Relatively High Mean				X		X	X			
Relatively Low Standard Dev.		X				X	X			
Significant Correlation with Criterion	X	X		X	X		X	X		
Aptitudes to be Considered for Trial Norms	G	V		S	P	Q	K	F		

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of Aptitudes G, V, S, P, Q, K, and F at trial cutting scores were able to differentiate between the 67% of the sample considered good workers and the 33% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly higher than one standard deviation below the mean will eliminate about one-third of the sample; for four-aptitude trial norms, cutting scores of slightly lower than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of V-100, S-85 and Q-90 provided a high degree of differentiation. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .40 (statistically significant at the .0005 level).

Table 6

Concurrent Validity of Test Norms V-100, S-85 and Q-90

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	12	42	54
Poor Workers	17	10	27
Total	29	52	81

Phi Coefficient (ϕ) = .40
Significance Level = $P/2 < .0005$

Chi Square (X^2) = 13.04

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 36 OAP's included in Section II of the Manual for the General Aptitude Test Battery. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.

SP-21
Rev. 2/61

- 7 -

A-P-P-E-N-D-I-X

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score _____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Sex: Male _____ Female _____

Company Job Title: _____

How often do you see this worker in a work situation?

- ☐ See him at work all the time.
☐ See him at work several times a day.
☐ See him at work several times a week.
☐ Seldom see him in work situation.

How long have you worked with him?

- ☐ Under one month.
☐ One to two months.
☐ Three to five months.
☐ Six months or more.

- A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)
- ☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
 - ☐ 2. Capable of low work output. Can perform at a slow pace.
 - ☐ 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.
 - ☐ 4. Capable of high work output. Can perform at a fast pace.
 - ☐ 5. Capable of very high work output. Can perform at an unusually fast pace.
- B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)
- ☐ 1. Performance is inferior and almost never meets minimum quality standards.
 - ☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.
 - ☐ 3. Performance is acceptable but usually not superior in quality.
 - ☐ 4. Performance is usually superior in quality.
 - ☐ 5. Performance is almost always of the highest quality.
- C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)
- ☐ 1. Makes very many mistakes. Work needs constant checking.
 - ☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.
 - ☐ 3. Makes mistakes occasionally. Work needs only normal checking.
 - ☐ 4. Makes few mistakes. Work seldom needs checking.
 - ☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

- ☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.
- ☐ 2. Has little knowledge. Knows enough to "get by."
- ☐ 3. Has moderate amount of knowledge. Knows enough to do fair work,
- ☐ 4. Has broad knowledge. Knows enough to do good work.
- ☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

- ☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.
- ☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.
- ☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.
- ☐ 4. Usually does his job without difficulty. Well suited to this kind of work.
- ☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

- ☐ 1. Cannot perform different operations adequately.
- ☐ 2. Can perform a limited number of different operations efficiently.
- ☐ 3. Can perform several different operations with reasonable efficiency.
- ☐ 4. Can perform many different operations efficiently.
- ☐ 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

- ☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.
- ☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.
- ☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.
- ☐ 4. Usually able to handle new situations. Needs help on only complex problems.
- ☐ 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. How many practical suggestions does he make for doing things in better ways? (Worker's ability to improve work methods.)

- ☐ 1. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.
- ☐ 2. Slow to see new ways to improve methods. Contributes few practical suggestions.
- ☐ 3. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.
- ☐ 4. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.
- ☐ 5. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and only these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

- ☐ 1. Would be better off without him. Performance usually not acceptable.
- ☐ 2. Of limited value to the organization. Performance somewhat inferior.
- ☐ 3. A fairly proficient worker. Performance generally acceptable.
- ☐ 4. A valuable worker. Performance usually superior.
- ☐ 5. An unusually competent worker. Performance almost always top notch.

FACT SHEET

Job Title: Inhalation Therapist (medical ser.) 079.368

Job Summary: Makes daily rounds to check equipment, verify correct therapy from attending nurse and secure information for billing the patient. Dispenses apparatus, sets it up and makes it ready for use.

Administers intermittent positive pressure breathing treatments and gives simple pulmonary function tests to designated patients.

Performs related duties such as replacement of defective parts of equipment and other duties as assigned by director.

Work Performed: Makes daily rounds for the purpose of checking equipment, verifying correct administration of inhalation therapy by attending nurse, and securing necessary information for billing patient. During daily visits to each inhalation therapy case, checks doctor's orders in order book and sees to it that they are being carried out. Makes sure that apparatus is in good working condition and that attending nurses are using proper techniques and safety precautions. Determines (for billing purposes) from chart or nurse the amount of time apparatus was used on patient. Removes equipment not being used and carries it back to therapy room. Maintains daily statistical records pertaining to department. Records all information, clerical or technical, pertaining to inhalation therapy on patients. Makes out charge slips and relays information daily to business office.

Dispenses apparatus, sets it up and makes it ready for use. Operates the following equipment as ordered by physician: heated aerosol pot, exsufflator, Bird respirator, heated nebulizer, resuscitator, oxygen tent, croupette and nasal catheter. Carries or pushes apparatus to designated patient's bedside. Checks doctor's orders by referring to order book. Instructs patient as to why and how apparatus is to be used in order to calm him and gain his confidence. Assembles equipment and starts therapy on the patient. Instructs attending nurses on proper techniques for administering the type therapy ordered. Obtains and enters on Kardex card patient's name, location, status, type of therapy, diagnosis, doctor, and time and date therapy was started. Places card in new patient Kardex record file in Inhalation Therapy department.

Administers intermittent positive pressure breathing treatments to designated patient. Pushes machine to patient's bedside. Checks doctor's orders. Obtains prescribed medication from attending nurse.

Explains and demonstrates procedure to patient in order to calm him and gain his confidence. Measures prescribed amount of medication and transfers it to nebulizer of machine. Raises patient to sitting position, if possible, so that patient can breathe more effectively. Places mouthpiece in patient's mouth, instructing patient to breathe back and forth into the machine. Manipulates controls in order for patient to receive proper amounts of medication and gas pressure. Observes patient closely for side effects of medication. Discontinues treatment after prescribed time or medication is gone. Determines if patient will be able to take his own treatments and, if so, thoroughly instructs patient on procedure by having patient manipulate controls of machine. Instructs attending nurse on technique for administering intermittent positive pressure breathing treatments. Obtains complete information on patient for Inhalation Therapy department Kardex file. Visits daily, all patients receiving this type therapy. Thoroughly cleans and checks the machines. Makes sure that patient is receiving proper therapy by referring to the doctor's order book and then observes that the physician's orders are being correctly carried out.

Performs related duties as assigned by director. As needed, distributes cylinder gases in a safe manner to various hospital locations. Uses a cart designed for this purpose. Takes phone calls as necessary. Repairs, cleans, and sterilizes inhalation therapy equipment according to correct procedures and stores it in proper place. Keeps informed on current information through literature, exchange of information with other interested persons, and attendance at appropriate meetings or lectures.

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